SCIENCE

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SCIENCE IN THE PUBLIC PRESS[1]

By SIR RICHARD GREGORY, Bart., F.R.S.

EDITOR OF NATURE

THREE separate factors—science, the public and the press—are involved in the consideration of the subject of this address. Whatever science has to say, and whatever facilities are afforded by the press for saying it, the decision whether to read or pass over what is offered rests with the public. Knowing that its verdict is final, the policy in most newspaper offices is to publish matter which will be acceptable to as large a section of the community as possible. From a business point of view, this is the only sound principle to be followed, especially as the advertising revenue is largely determined by the number of the net sales. Among the readers of all newspapers, however, are many types of mind and a variety of interests; and a wise editor endeavors to appeal to most of them. He can secure distinction for his journal by being ahead of some of his readers in the attention given to particular subjects, but he must not be too much ahead in most of the subjects for most of his readers if the journal is to survive and its circulation be maintained or increased. This is true of all periodicals, and should be borne in mind in discussions of the relations of science to the press or of the press to science.

The function of a daily or weekly newspaper is to provide reading and readable matter for a general or particular public—the main part being intended for all who care to read and the special columns for those whose interests are in particular fields of thought, work or sport. Usually the matter is presented in the form of (1) news items dealing with occurrences or opinions factually treated; (2) articles of a more extended character, or essays, dealing with their subjects in a less summary fashion and more informative

[1] Presidential address delivered on September 21, 1934, at the eleventh annual conference of the Association of Special Libraries and Information Bureaux, at Oxford.

than is necessary or possible in the news items; and (3) leading articles written or inspired by or through the editor and ostensibly setting out the considered view of the journal and the interests it represents.

It is scarcely too much to say that most of the matter published in newspapers is regarded as being of an ephemeral character, though a more correct view would be to regard the attention given to it by its readers as ephemeral. The durability and value of an item of information or news given in a newspaper depends entirely upon the previous knowledge, the interests and the occupation of the person by whom it is read. The discovery of a new comet or of a new constituent in atomic structure may be of vital concern to astronomer or physicist, but of passing interest only to the man in the street. The discovery of a new process in manufacture, which may affect permanently the lives of thousands, may pass under his eye almost unheeded.

The object which a newspaper has in view primarily is to get sold and read. This is no mere cheap cynicism. The whole format of a newspaper—size, quality of paper, type, arrangement, illustration and make-up generally—are directed to this end. It must attract readers by its general appearance in the first instance. This is imperative, for a paper that does not attract constantly is a paper without influence or with very little. But it must add to this attraction of form the appeal of the interest in its news. It is in this sense that it is true that the newspaper, especially the cheaper and lighter press, in its attempt to gauge what class of matter will hold its readers and increase their number may be said to follow and not to lead the opinion of its public. Hence also, with certain qualifications, the attention which the press can afford to give to science depends upon the public interest and demand for news about it. Newspaper editors and their staffs aim at supplying these needs; it is they who have to be convinced that a large section of the public has a genuine interest in scientific subjects, and that this interest is sufficiently strong to justify giving a fair amount of attention to developments in science. Science news may be of high importance and wide interest without being a "scoop" or a "sensation"; and editors should realize that the romance of modern scientific achievement need not involve a sacrifice of truth.

If it is to be admitted that science, and more especially scientific progress and discovery, are of interest to the public, tradition helps to define the attitude which will be taken by the press. Science is "news"; it is matter fitted from time to time, as occasion arises and its interest becomes topical, for extended treatment by informed writers and specialists in special articles; and it is matter for editorial comment, more especially when it impinges upon public concern in connection with the health and well-being of the community or in its application to legislation, administration or commerce and industry.

It is, however, difficult to estimate the extent to which the public as a whole, reading the daily and weekly newspapers, expect to be informed in its own language of important developments in, for example, such intricate matters as atomic constitution, quantum theory, relativity or the significance of chromosomes. The attention given to such subjects in the public press depends, of course, largely upon the type of journal; and what may be published appropriately in *The Times* would be out of place in the less substantial daily papers. Most editors know their business and publish what experience has taught them their readers like: when they do otherwise, the circulations of their journals suffer.

It ought not to be too much to expect that every daily or weekly newspaper of importance should have upon its editorial or reporting staff some one capable of dealing intelligently with scientific subjects in the same way that special attention is given to other activities. Our complaint is that, with very few exceptions, little attempt is made in the public press to secure adequate or accurate treatment of scientific news. In the whole kingdom there are apparently not a dozen daily papers which have on the editorial or reporting staffs a single member with a science degree, or even with sufficient elementary knowledge to pass a school certificate examination in general or everyday science. While these conditions exist, the public will lack in science the enlightened guidance which they receive in other matters.

In the newspaper world it is recognized that information and guidance in financial matters should be entrusted to financial experts. The services of similar special critics of art, music and drama are used in the production of the chief daily and weekly newspapers; and sport is now so highly specialized that separate contributors are appointed to deal with racing, golf, cricket, football, tennis and other branches of it. No editor of a leading newspaper would think of entrusting his columns devoted to any of these activities to a reporter or other contributor unfamiliar with the principles of the subject or the elementary rules of the game. This, however, is what is usually done when reports are required of scientific meetings, or a scientific man is interviewed upon the significance of a particular discovery. It is most rare for a reporter or interviewer sent to deal with a scientific matter to know even the alphabet of the subject. The result is usually that trivial points are given undue attention while the main matters are misrepresented or expounded with irritating confusion.

Art and letters, music and religion, have their interpreters in the periodical press and can not com-

lain of any lack of attention to their works or teachg. In its human interests, science can make just as ide an appeal as any of these, but there are few who n review scientific matters with the independent and itical mind which estimates the value of opinions or rformances in other spheres. A bare announcement a scientific discovery may be worth publication as item of news, but not much more so than a report at an important creative work has been completed y an eminent artist or man of letters. Supplemenry to such news, reasons must be given why the disvery or work is of particular significance; which eans that its characteristics must be clearly described a competent writer. While it is easy enough to cure contributors able to express opinions, with ore or less authority, upon works in literary fields, scientific contributor could presume to deal simirly with original work in the realm of nature unless possessed first-hand knowledge of the particular bject.

There are a fair number of writers who can make bstracts or digests of scientific papers, or even proide a statement of the main points intelligible to aders without very special knowledge, but something ore than condensations of this kind is needed before ience news will find a regular place in the public ress. Most people have yet to learn how and why ience and scientific thought are the determining facrs in the chief problems of progressive life, and the re record of new results can do little to enlighten em. To be a successful expositor of science, it is ecessary to be suggestive as well as accurate, to show man contacts with the facts described, and enable e reader to appreciate the wide interest of the parcular subject presented. In recent years, much atntion has been given to the cultivation of appreciaon of art, music and literature; with the result that ch fields of study and delight have been opened to any people formerly unfamiliar with them. Someing of the same spirit and intention is required of terpreters of science if its work and development e to be followed with enlightened pleasure. No disvery could be described in isolation, but in relation its scientific background.

It must be acknowledged that the attitude of the dividual scientific worker—and here allusion is made ore particularly to the scientific worker who is enged in research—is by no means universally well isposed towards newspaper publicity. Quite apart om the danger, which after all is perhaps not really ry great, of premature disclosure of results either efore they have been thoroughly tested and digested, r before it has been possible to secure them against legitimate exploitation, the scientific worker often as reason to accuse the popular press of superficial eatment which is misleading, or of giving to the world a garbled version of the material passed to it, which is no less harmful to the interests of scientific advancement. As regards the correctness of the information published, though it is true that the special equipment of those who collect scientific news usually leaves much to be desired, it should be remembered that each individual has to cover a wide range of subjects. When the very technical character of the material which is embodied in the press matter sent out from congresses, scientific meetings and laboratories is considered, it is perhaps remarkable that the reporter achieves such success as he does.

Whatever may be the attitude of the individual man of science towards publicity, it is obvious that his objection is not universal, but is directed towards publicity of a particular kind. For publication of his results is normally an essential of his work. Not only must his own results be published and made accessible —not primarily that credit may accrue to him, though that is not without its importance—but in order that his methods and results may be probed and tested by his fellow workers before they can be added to the accepted mass of facts and theories which we call "science" as a whole. Further, his work when thus made accessible to his fellow workers serves as a stepping-off place for further advance. In the same way he himself makes use of the published results of others.

To meet these needs of the research worker, and also of the man of science who, while himself not actually engaged in research, may for professional reasons have to keep himself abreast of progress, an elaborate machinery has been built up. For verbal discussion there are learned and scientific societies and congresses, the latter usually international in character, attracting members from all quarters of the globe. Then in the matter of publication each of these organizations, as a rule, publishes a report of proceedings, and although these are intended primarily to record only their respective proceedings and meetings, most of them throw open their pages for other contributions not all necessarily written by their own members. Further, there are independent scientific publications devoted entirely to scientific subjects, and a host of technical periodicals dealing with the application of science to practical affairs in various aspects. Hence the scientific worker may be said, generally, to be very fully provided with opportunities for the publicity which is essential for the record and discussion of his work; though from this point of view the public press is of no assistance to him.

On the other hand, the publications which are essential to the scientific worker are of no advantage to an interested public which is without technical knowledge, and often technical knowledge of an advanced character. Not only is the language abstruse—that is a

minor difficulty—but the argument is allusive and proceeds on the assumption of a background of knowledge of fact and theory which are the property of the expert only. Before this can become intelligible to the uninstructed it must be translated, expanded and expounded.

All this material is "news"—"news" which the press is anxious to have when once its bearing is understood, and "news" which appeals readily to the public when placed before them in a form which can be absorbed. Yet very few scientific men have the time or inclination, and indeed not many have the ability, to transform scientific material into such a form as will be understood and appreciated by the plain man. This is a misfortune in more ways than one. Consider, for example, the study of archeology. One of the most remarkable features in scientific journalism of the last ten or fifteen years has been the extraordinary interest which has been taken by the newspaper public in the progress of research into man's past. Anything dealing with the descent of man, prehistoric man in any part of the world, the archeology of Egypt, Mesopotamia or America or elsewhere has been followed with the closest attention. Articles by experts have been and are still welcomed in the columns of the daily press on almost any aspect of the subject. The reason is not far to seek. The technique of archeological research, elaborate as it now is, consists of processes which are familiar to every one; and the language in which the progress of excavation is described and the results expounded is the language of the every-day life of the average educated man.

Most scientific workers, however, have no desire to discourse to the laity and no capacity for transforming the special vocabularies of their subjects into the simpler—and not necessarily sensational—forms required by many general readers. It ought, therefore, to be gratefully recognized that the lay writer who is sufficiently well informed to present a scientific subject in attractive literary style, and accurately as well, is performing a very useful purpose for science. The investigator who can do this for advances to which he has himself contributed, and on which he can express himself with authority, can always find a genuine welcome in the lecture hall or in the periodical press. Only rarely, however, are the faculties of research and exposition so closely combined; and it is almost too much to expect them to be. After all, the first business of the scientific investigator is to discover—to add to the sum of natural knowledge—and if he describes his work clearly and in terms which are intelligible to his fellow workers he has done his part.

A scientific investigator is usually too much engrossed in his special subject to pay much attention to style or method in the presentation of his results. His vocabulary is that of other workers in the same field; and if he makes his work clear to them, he is satisfied. In a contribution to a scientific society the use of technical terms and symbols can, therefore, be justified. If, for example, an author is dealing with a highly-specialized development in mathematical physics, he has a right to assume that his audience or his readers are familiar with the language he uses. He can only be blamed if he fails to make himself intelligible through confused thinking or want of care in arranging his ideas in logical sequence or expressing them concisely. Language can not be rightly called "jargon" when it is the usual means of communication between workers in a recognized department of science, but only when it is confused or unintelligible. Every profession has its special terms and phraseology; and scientific investigators have just as much right or reason to address one another in what may seem slang as have stockbrokers, bookmakers or even lawyers. From the literary point of view, such barbarisms may be abominable, but within their particular field they are expressive and concise, and therefore appropriately fulfil the function of language.

It is unfortunate that the pursuit of science is commonly regarded by representatives of the periodical press as a mysterious occupation, and experiments as magic comparable with conjuring tricks. The fault probably lies in our schools and universities, from which it is still possible, and usual, for students to pass out with distinction into the world without any acquaintance with what science has done, and is doing, to shape human destiny. It is still assumed that a man may have pretensions to culture and yet know nothing of the natural world around him. Science may have been a sealed book to him throughout his educational career, yet in whatever field of activity he is afterwards engaged he will frequently be faced with problems requiring scientific knowledge for their solution, and should, therefore, understand when and how to seek scientific guidance. We should be sorry to suggest that specialized instruction in science should be forced upon every student in school or university—though that would only be following the classical tradition—but we do urge that no one today can justly claim to have had a liberal education without having been introduced to the methods of scientific inquiry, the development of scientific principles and the social and economic consequences of scientific discovery.

Whatever the ideals of a people, it is doomed to stagnation unless its science is living and is continually informing every activity of national life. It can scarcely be said that, in the educational training of our citizens, recognition of this factor of progress is

given to a degree at all commensurate with the national need, or that the responsible press of the country is doing anything to make the public understand the position which science occupies in the fabric of civilization. Knowing nothing of science, and with the distrust of the expert which is our national characteristic, editors and sub-editors of popular daily papers are unable to distinguish between the assertions of pseudo-scientific charlatans and the conclusions reached by scientific investigators as the result of careful inquiry. A sensational announcement is therefore preferred to a sober and accurate account of a scientific advance; and blunders are given harmful circulation which would be thought amazing if perpetrated in a like fashion in the domains of literature or art or history. Such lack of knowledge of scientific facts and principles might be excused in the multitude, but something more should be possessed by those who have had the advantage of higher education, and ought, therefore, to be impressed by the activity upon the quays where rich argosies of scientific exploration are continually being unloaded.

It is desirable also to cultivate in the mind of the public an understanding of the purposes for which men devote their lives to scientific experiment and inquiry. The aim of the pursuit of pure science is the discovery of natural truths, and this is just as laudable a desire as the search for beauty; for, as Keats told us:

> Beauty is truth, truth beauty; that is all
> Ye know on earth, and all ye need to know.

Too little attention is given to this aspect of the quest for knowledge and too much to the actual results achieved, which often represent the least interesting part of the story of why the quest was undertaken and how the goal was reached. The human interest in exploration in any field lies in the log book of the journey, the difficulties met, and how they were overcome, until the object of the expedition is attained. The public may not be able to understand clearly why a scientific inquiry is undertaken, any more than it understands why attempts should be made to reach the summit of Mount Everest, or why for generations explorers should have competed with one another in the race to the north and south poles. Human aspiration and the spirit of conquests are the main motive power of all such endeavors, and not the practical advantages which may accrue from the results achieved. So should the objects of research in the realm of pure science be regarded, and from this point of view should the thoughts and experiences of the adventure be described.

The acceptance of this principle means that the best narrative of an exploration is one written by the explorer himself, who alone can have intimate knowledge of experiences met with during the expedition or describe the considerations which led him to move in one direction or another. This is usually understood, and that a plain record of travel, even though given and expressed in commonplace phrases, makes much closer contact with human feeling than the most brilliant literary effort of a spectator or historian. It follows that as scientific investigators themselves possess the first-hand knowledge of the meaning, the methods and the conclusions of their researches, they are best qualified to translate this knowledge to the public. Few men of science care, however, to be diverted from their work in the field or laboratory in order to share the press publicity equally afforded to assertive paradoxers and discoverers of marvels, which if true are not new and if new are not true. Though his story may well be worth telling, an original investigator usually shrinks from entering the province of popularization of science and has a feeling that to do so involves a loss of dignity, as well as a loss of respect from his colleagues.

So long as this reluctance prevails among scientific workers, they must expect the exaggerations, inaccuracies and omissions with which scientific matters are commonly handled in the periodical press. A not inconsiderable section of the public is prepared to be interested in lucid accounts of new conceptions in science and the evidence upon which they are based; and we suggest that it is a duty of men of science to assist in making such information known. There is no hesitation in communicating new results to scientific and technical periodicals, and probably not one per cent. of these announcements or papers could be made intelligible to general readers. Even this small proportion is sufficient, however, to provide impressive scientific news if described in clear, understandable language; and if it is not so presented, science as well as the world loses much of the value of the new knowledge.

Most admirable work for science publicity has been carried on in the United States since 1921 by a non-profit-making corporation called Science Service. The establishment of this institution for the purpose of disseminating scientific information to the public is due to a man of high ideals—the late Mr. E. W. Scripps—whose long and wide experience as newspaper editor and proprietor convinced him of the importance of scientific research as the foundation of national prosperity and the guide to sound thinking and living. Mr. Scripps himself drew up the scheme showing the general method of work of an association or organization for the propagation of scientific knowledge and placed $30,000 a year at its disposal at the beginning. He provided also that at his death the sum of $500,000 was to be available for the promotion of the objects he had in mind. The follow-

ing paragraphs from a memorandum prepared by Mr. Scripps in 1919 show clearly his purpose in founding a press publicity service:

The object of this institution, the American Society for the Dissemination of Science, should be to make the greatest use of the press in the way of disseminating the knowledge which is the result of painstaking research carried on by a few hundred, or at least a few thousand, well-trained men equipped with great mental capacity.

The first aim of this institution should be just the reverse of what is called propaganda. Its objects should never be to furnish argument or facts for the purpose of producing partisans for any particular cause. Its sole object should be to present facts in readable and interesting form—facts on which the reader could and probably would base his opinion on a subject of policies or sociology or concerning his duty with regard to himself and his fellows.

Science Service is the concrete expression of Mr. Scripps' belief that the unity of the professions of science and journalism could be used effectively to educate the community in the factors which vitally influence human welfare and progressive development. It is under the control of a board of trustees composed of nine men of science and six journalists, the scientific members being nominated by the three leading national scientific bodies in the United States; and it occupies offices in the fine building of the National Academy of Sciences, in Washington. The director and managing editor of the organization is Mr. Watson Davis, whose training as a physicist and engineer, combined with experience as a journalist, make him particularly well qualified to know what scientific news will interest editors and general readers, and also how to make new scientific knowledge intelligible to the laity.

The activities of this science news service are many and various, including a daily syndicated service to newspapers, special reports on current topics and events, interpretive articles suitable for editorial columns, special articles written by leading men of science and other authorities, science news talks for broadcasting stations, a weekly publication entitled *Science News Letter* in which the current progress of science is concisely summarized and illustrated, and as a central bureau for the distribution of seismological, magnetic and solar observations of current interest. Science Service has in its offices at Washington a staff of writers each of whom can deal with scientific matters in a particular field, such as medicine, biology, archeology, psychology, chemistry, physics, astronomy, engineering and so on. At a number of capitals in the world, and at centers of research in the United States, the organization has competent correspondents who cable, telegraph and post special news of scientific discoveries or developments to Washington, whence it is edited and distributed by telegraph and mail to newspapers throughout the country. About one fourth of the newspaper readers of the United States have the opportunity of reading something by Science Service, daily or weekly.

It would be to the advantage of science and the newspaper press if similar organizations for science publicity were established in other countries and co-operated with one another in an international science agency. Science Service already expends a considerable sum annually on scientific news from Great Britain, and it is hoped that a bureau will eventually be established in this country to supply newspapers with scientific matter in the same way as is done so successfully in the United States. Several attempts have been made to found such a science news service here, but little encouragement has been given to them by either men of science or newspaper editors. Ten years ago the British Science Guild arranged with Mr. G. D. Knox, a journalist who devoted particular attention to scientific subjects, for the preparation of suitable articles and notes on scientific topics and events, as well as special contributions by leading authorities, for distribution to the public press on an agreed scale of payment. This service had, however, to be abandoned through lack of support. In the report of the Council of the Guild for 1923–24 it was pointed out that there was little prospect of the service being self-supporting; and on this account it could not be continued. The position was expressed in the report as follows:

It may be doubted whether the Guild can appropriately take up the functions of a Press Agency on a commercial footing, for that would mean the appointment at a suitable salary of a director familiar with agency work, and also an office adequately equipped to carry on work of this kind. If sufficient funds were available, such a Science News Agency could, of course, be established, and its activities would undoubtedly prove of decided advantage to both pure and applied science; but in the absence of such support, the Guild could not undertake the financial responsibility which such an agency would involve.

Since that time other efforts have been made to prepare and distribute scientific news through a central bureau, but with no better success. In recent years, however, Dr. Victor Cofman, a European correspondent of Science Service, and Donald Caley, Fleet Street journalist who specializes in science and is British correspondent of Science Service, have devoted much time and attention to the subject. It is to be hoped that these efforts will be encouraged, but a science news publicity service can not be self-supporting from the beginning, and funds will have to be provided by private benefactors or societies inter-

ested in the promulgation of natural knowledge if it is to be placed on a permanent footing. The annual income of Science Service, Washington, is about $100,000, and it is made up of $70,000 for services to newspapers, sales of books, etc., and $30,000 from the Scripps' endowment. There is an operating deficit of about $30,000 annually on the whole working of the service, but this is largely due to developments continually being undertaken in the spirit of the endowment.

Dr. Cofman estimates that the cost of maintaining a science news service in this country to supply about twenty news items a week, that is, about half the number issued by Science Service, Washington, would be of the order of £1,500—£2,000 annually, made up of salaries of director and clerical staff, office expenses and payment for scientific information. An exchange arrangement with scientific news agencies abroad would considerably enlarge the service without adding greatly to the cost. The income derived from payments by newspapers for news or articles published is scarcely likely to amount to one half the expenditure involved in the service, so that unless a substantial subsidy is forthcoming, to cover a period of, say, five years, there seems to be no possibility of establishing in Great Britain a science news service like that in the United States, even on the most modest scale. As a business undertaking, such a service can not be a profitable proposition for several years. In the absence, therefore, of a far-sighted public benefactor who will follow the example of the late Mr. E. W. Scripps, science must continue to suffer from inadequate and inaccurate representation in the public press generally.

It can not be said that scientific societies or scientific men themselves exhibit much interest, and certainly no enthusiasm, for the establishment in this country of a science publicity service worthy of their confidence. It is true that summaries of lectures and papers given before bodies like the Royal Institution and the British Association are prepared for distribution to the public press, and that some scientific departments similarly issue descriptive digests of the main points in official reports. To make the best use of this material, however, it needs to be passed through the mind of a journalist familiar with science as well as with the interests and limited knowledge of newspaper readers in general. No single individual can be expected to deal in this way with every scientific subject, but it should be possible to bring together a group of scientific journalists, as is done in the offices of Science Service, capable of presenting the major scientific news to the press in a form which would be acceptable to editors and the public. The time will come when agencies for the collection and communication of such news will be used just as extensively by newspapers as those which deal to-day with political affairs.

It must be apparent to any one who devotes a little consideration to the methods by which the announcements of scientific advance reach the public through the press, that present arrangements are far from satisfactory. The field is only partially covered. Only in any branches of inquiry which happen to be very much in the public eye at any given moment is any attempt made to keep the public adequately informed of what is being done. Still less is any attempt made to place before it regularly the relation of any advance to the general body of knowledge or the bearing of discovery on the interests of the individual and the community. As an example of what might be done on a larger scale, it is sufficient to point to Sir James Jeans's books, in which new conceptions in astronomy and physics and the intellectual foundations of science are presented, or Professor Julian Huxley's broadcast talks, particularly those which dealt with the effects of discovery in pure science when applied to industrial processes and methods. It is surprising to what a large body of readers these books and a few others of like character have come as a revelation of what is being done in the realm of pure science and how it touches their lives at many points, without that fact having been appreciated by them.

These considerations and others of a like nature lead to the reflection that while there is ample material available which would prove not only of the greatest interest but also of the greatest moment to the public to know, it does not reach that public through channels which are ready to receive it, if the demand were made plain, owing to a defect in organization. The press, which should act as an intelligence officer for the public, to keep it informed of matter of importance to its welfare, is itself imperfectly informed. This is not necessarily a fault to be imputed to the press. Just as there is a body of experts—Reuters, Press Association and other agencies—who handle foreign news, supplemented it is true in the case of the more important journals by experts of their own—their foreign correspondents—so in scientific matters the news could in the first instance be handled by a body of experts, a scientific news agency which could collect its material from scientific bodies and individuals, and then prepare it for circulation to the press. This would insure that the ground was systematically covered and that nothing that was of interest or moment to the public was overlooked.

In any such organization of scientific news, it should be remembered that the function of science is twofold. In the first place as a body of knowledge, man's endeavor to satisfy his curiosity about the uni-

verse and all that therein is, the aim of science is to add to itself, to enlarge its circle in all its branches until it has become all-embracing—an ideal no doubt impossible of attainment, but nevertheless continually stimulating the research worker and spurring him to further endeavor. But secondly, as science—ordered knowledge of facts—first arose from man's endeavor to understand the material and the spiritual world for the promotion of his own ends—the stars in their courses for purposes of agriculture and navigation, the ways of animals and plants for his own food, simple principles of topography and hence to mapping and geography that he might find his way about his own world, the beginnings of metallurgy that he might mould better weapons of bronze against his enemies still using copper or stone, so modern science, however much it may be pursued for its own sake, has nevertheless a practical end in view, in some sciences more remote than others. When the Augustinian monk Mendel began to cultivate sweet peas, with the object of learning exactly how tall and short peas when crossed passed on their qualities to their offspring and subsequent generations, it is unlikely that it was in his mind that the principles he was then to formulate would attain an importance we are only now beginning to appreciate—principles which when more fully understood will not only affect great financial interests in all undertakings—such for example as the meat and milk industries—in which questions of breeding enter, but may also affect very seriously questions affecting social reform and the future of the human race.

It would be possible to multiply almost indefinitely the questions of social and political well-being upon which the results of scientific research impinge no less directly than the theory of heredity. As these researches and many others affect the well-being of the citizen and the community directly, it is surely the duty of the press as a service of public utility and the man of science as a citizen as well as a discoverer, to effect a *rapprochement* in order to create a public opinion which will insure that no advantage may be lost which might accrue from the application of the results of scientific research to the needs and amenities of daily life. A more intelligent and more intelligible consideration of scientific work and thought is desirable in the public press because of their close contacts with many national and international problems. Under the conditions of modern civilization, the community in general is dependent upon science for its continued progress and prosperity. Under the influence of modern scientific discoveries and their applications, not only in industry, but also in many other directions, the whole basis of society is rapidly becoming scientific; and to an increasing extent, the problems which confront the national administration involve factors which will require scientific knowledge for their solution.

It is in these directions that the press can render the greatest service to science and the public at the same time. Under the present social and educational system, it is not possible to hope that at any very early date our schools will turn out a population of scientifically trained men and women. But it is becoming recognized, though slowly too, that what is needed is not so much detailed or expert knowledge of science, as the scientific outlook. The function of the press, more readily to be appreciated perhaps when something of this scientific spirit has been inculcated in the schools, might very well be, by fostering this outlook, to insure that the problems of government and administration, of society and of economics, are approached with scientific understanding. The problems of politics and society are not to be solved by the reiteration of party cries adopted by "little Liberals and little Conservatives," to use Gilbert's phrases of a bygone day, but by patient scientific consideration of the facts viewed in the full light of scientific knowledge and after a careful weighing of evidence. Here the press, without departing from its tradition, and if it is prepared to trust the interest and intelligence of its public, might serve itself, science and the state.

SCIENTIFIC EVENTS

RESEARCH ON NUTRITION IN GERMANY

THE regular Berlin correspondent of the *Journal* of the American Medical Association writes as follows:

"Federal health administration has been taken over by the Reichszentrale für Gesundheitsführung, which consists of eleven different federal *arbeitsgemeinschaften,* or mergers. The department of general nutrition is under the direction of Professor Reyher. A firm union of all the organizations combined in this department insures the avoidance of dangers that might threaten the enforcement of the common principles and prevents the special interests of any one group gaining the upper hand. In questions requiring special scientific study the federal bureau of health is ever ready to advise the members of the reichsarbeitsgemeinschaft, who are recruited from the different schools representing German research on nutrition. In addition to the testing of the modern principles of German science of nutrition, research on the biologic value of food products and the care of the foods themselves is being conducted. Emphasis

placed on the hygienic importance of transportation of food products and their distribution among the population. Methods of preserving foods are studied. Furthermore, in collaboration with the federal bureau of health, the uses of skim milk and potatoes, as additions to bread, have been investigated.

"The investigation of proposed reforms in nutrition constitutes a special field of research. The reform movement has offered to cooperate with the reichsarbeitsgemeinschaft. A standing committee has begun to perform practical work, and it appears likely that the objectionable features of the reform movement, as pointed out by men of science, will soon disappear. This committee, in collaboration with the federal ministry for popular education and enlightenment, will control the publicity service, which is suffering from mismanagement, and if attempts are made to oppose such development, action will be taken to eliminate all opposition.

"The second department, under the direction of Professor Schlayer, has the task of elaborating and establishing dietetic criteria for patients in the hospital and in the spas and health resorts. It is also the duty of this department to establish criteria for the selection and training of the personnel responsible for the nutrition of patients and convalescents.

"A special journal will publish results of the research of the reichsarbeitsgemeinschaft and the associated committees that have to do with the nutrition of the German people. A separate department will issue reports from time to time on the general nutrition of the people and will announce special diets to be used solely for patients and convalescents. The creation of a popular journal, whose essentials are now being worked out, has been announced by Professor Reiter (president of the federal bureau of health) for the fulfilment of this task."

CONGRESS OF THE INTERNATIONAL SCIENTIFIC RADIO UNION

THE International Scientific Radio Union, according to the London *Times,* concluded a conference in London on September 19, when, at the closing session resolutions and plans for international research were adopted by the General Assembly. Professor E. V. Appleton, Wheatstone professor of physics at the University of London, was elected president of the union in succession to Professor A. E. Kennelly, of Harvard University. He will hold office until the end of the next congress, which is expected to take place abroad in 1936 or 1937.

The presidents of the five commissions into which the union is divided were elected as follows: (1) Radio-frequency standards, Dr. E. H. Rayner, of the British National Physical Laboratory; (2) Propagation of Waves, Dr. J. H. Dellinger, chief of the radio section of the U. S. Bureau of Standards; (3) Atmospherics, Professor E. V. Appleton; (4) Liaison with amateurs, Professor R. Mesny, France; (5) Radiophysics, Dr. B. van der Pol, Holland.

The success of the research planned at the Copenhagen meeting in 1931, in connection with work in Polar regions, and during the solar eclipse of 1932, which has permitted a definite decision to be made between competing theories, has led members of the union to organize a more extensive series of experiments of similar character.

The foreign delegates who have attended the congress have expressed themselves, according to the *Times,* as being very much impressed with the state of scientific radio research in Great Britain. In particular, the arrangements of the wireless services of the G.P.O. at Rugby have received special commendation because of the economic accommodation of so many antenna systems on so small a site.

Another subject on which continual work has been carried out since the Copenhagen meeting is that of the development of standards of radio frequency and the comparison of the national standards in different countries. The National Physical Laboratory and the British Broadcasting Corporation have cooperated in this service by generating oscillations of a very steady frequency at Teddington, and transmitting them over Europe by radio stations of the B.B.C.

Agreement on the value of the frequency ascribed to such standardizing emissions, which are usually made in the early hours of the morning, by national laboratories receiving them, has attained an accuracy of one part in 10,000,000. This achievement holds great promise for enabling new methods of physical research to be developed in addition to ensuring a high accuracy among the standards of different nations by which commercial frequencies are measured.

OPENING OF THE NEW LILLY RESEARCH LABORATORIES

THE new Lilly Research Laboratories at Indianapolis were formally opened on October 11 in the presence of well-known investigators in the various branches of medicine. Eli Lilly, president of the company, was chairman at the formal exercises and J. K. Lilly, chairman of the board, addressed the assembly on "Research in Manufacturing Pharmacy." Dr. Irving Langmuir, associate director of the Research Laboratory of the General Electric Company, discussed "The Unpredictable Results of Research"; Sir Frederick Banting, of the University of Toronto, spoke on "The Early History of Insulin"; and Sir Henry Dale, chairman of the British National Institute for Medical Research, delivered an address en-

titled "Chemical Ideas in Medicine and Biology." Visitors later inspected the new laboratories.

In the evening a banquet was tendered the guests at the Indianapolis Athletic Club in honor of the distinguished visitors. Speakers on this occasion were Sir Henry Dale; Dr. Elliott P. Joslin, and Dr. George R. Minot, of Boston; Dr. Frank R. Lillie, of Chicago; Dr. Charles R. Stockard, of New York; Dr. George H. Whipple, of Rochester, New York; Dr. Carl Voegtlin, of Washington, D. C., and Dr. G. H. A. Clowes, director of the Lilly Research Laboratories.

While the research activities of Eli Lilly and Company are expected to center in the new laboratories, special research will be continued at the Lilly Biological Laboratories, near Greenfield, Indiana. A branch research laboratory is maintained also during the summer months in conjunction with the Marine Biological Laboratories at Woods Hole, Mass., and in addition special studies are carried on in cooperation with research groups in universities and clinics both in the United States and in foreign countries.

The new Lilly Research Laboratories comprise three stories and a basement. The main building is 220 feet long and 53 feet deep. The animal building, a separate unit attached to the main edifice, is four stories above ground and is air-conditioned throughout. The buildings are constructed of concrete, brick and Indiana limestone. Henry Hering, the American sculptor, designed the carvings that flank the front entrance—symbolic figures of Hygeia, the goddess of health, and Aesculapius, the father of medicine. On the first floor, there are a reception hall, a seminar room, administrative offices and laboratories equipped with the latest facilities for carrying on investigations in biochemical research.

The second floor houses the offices and laboratories of the organic research staff. There is an amphitheater for demonstrations of one kind and another. There are dark rooms and chill rooms and laboratories with small-scale production facilities. Laboratories for pharmacologic research are also on this floor.

The third floor is occupied by the biological research laboratories. On this floor, also, is the research library. The reading room is beautifully decorated, soft-light is assured through stained glass windows. The ceiling is arched, with bas-relief designs. The walls are of panelled oak. Small private rooms for investigators adjoin the library.

RESEARCH ON THE ISOTOPES OF HYDROGEN

THE National Research Council through Dean Richtmyer and Dr. F. W. Willard suggested last spring that a committee be organized to aid research workers on the isotopes of hydrogen in the avoidance of duplication of research work in this field, if such duplication appeared to be undesirable to those research workers involved. The very rapid development of research work on this subject has resulted in many duplications which the research workers themselves would have been glad to avoid. This committee has been organized during the summer months and held its first meeting at Cleveland, Ohio, on Thursday, September 13.

The committee consists of Professor Harold C. Urey, Columbia University, *chairman;* Professor John R. Bates, University of Michigan; Dr. F. G. Brickwedde, U. S. Bureau of Standards; Professor G. H. Dieke, the Johns Hopkins University; Professor H. L. Johnston, Ohio State University; Professor E. O. Lawrence, University of California; Dr. Irving Langmuir, General Electric Company; Professor H. D. Smyth, Princeton University; Professor H. S. Taylor, Princeton University; Dr. M. A. Tuve, Carnegie Institution, and Dean F. C. Whitmore, Pennsylvania State College.

The meeting was attended by all members of the committee, with the exception of Dean Whitmore and Professor Lawrence, and in addition by the following who took part in the discussion: Professor S. C. Lind, Dr. L. H. Reyerson and Professor George Glockler, of the University of Minnesota; Professor V. K. LaMer and Professor Mary L. Caldwell, of Columbia University.

The research programs of the institutions represented as they touched on work involving deuterium were discussed in considerable detail. For the most part very little overlapping of research programs was encountered. Those attending the meeting expressed the view that the meeting had been a very pleasant and profitable one, and hoped that similar meetings may be held in the future.

The discussions of the committee and the others who attended brought out certain salient points in regard to the duplication of research work in such a field. In the first place it may be very desirable that research work shall be duplicated. Again, research workers may have programs of research which they wish to carry through, regardless of whether others wish to work in the field or not. However, there may be cases in which people working on some problem would rather not duplicate each other's work, and it is the desire of the committee to aid in any way it can to avoid such duplication as this.

Professor Taylor moved, and the committee adopted the following resolution:

Resolved, that the National Research Committee on Hydrogen Isotopes shall act as a clearing house for researches in progress on deuterium until the spring

meeting of the American Chemical Society in New York, at which time it shall ascertain by correspondence or otherwise whether it should continue so to act.

Resolved, that publicity should be given to this function of the committee through appropriate media of publication, for example, SCIENCE, the News Edition of *Industrial and Engineering Chemistry*, and the *Review of Scientific Instruments*.

If any one who is contemplating work on deuterium or has such work in progress wishes to know whether it is being duplicated by others, and will write to the chairman of the committee, the committee will attempt to give them what information it has in regard to such duplication.

HAROLD C. UREY
Chairman

SCIENTIFIC NOTES AND NEWS

THE honorary degree of doctor of science was conferred on Founder's Day by Lehigh University on Dr. Irving Langmuir, associate director of the Research Laboratory of the General Electric Company.

THE degree of LL.D. will be conferred on General J. C. Smuts on the occasion of his installation as rector of the University of St. Andrews on October 17. The degree will also be conferred on Sir Thomas Holland, principal and vice-chancellor of the University of Edinburgh, president of the British Association for the Advancement of Science in 1929, and on John Hutchinson, of the Kew Herbarium.

IN connection with the centenary of Durham University College of Medicine, at Newcastle, England, the doctorate of hygiene was conferred on Sir Francis Acland, M.P., chairman of the Dental Board of the United Kingdom.

SIR GRAFTON ELLIOT SMITH, professor of anatomy at University College, London, and Professor Ch. Nicolle, director of the Pasteur Institute at Tunis, have been elected honorary foreign members of the Royal Academy of Medicine of Belgium.

DR. ALBERT SAUVEUR, Gordon McKay professor of metallurgy and metallography at Harvard University, has received the achievement medal of the American Society for Metals. In honor of Dr. Sauveur, the first recipient, the medal will henceforth be known as the Albert Sauveur Achievement Medal and will be awarded annually. Dr. John Chipman, research engineer, of the University of Michigan, received the Henry Marion Howe medal and W. B. Coleman, of Philadelphia, the president's medal.

THE American Welding Society, meeting in conjunction with the National Metal Congress, awarded the Miller Memorial Medal to J. C. Lincoln, president of the Lincoln Electric Company of Cleveland, for his work in improving the technique of welding medals.

THE medal of the American Society of Chemical Industry, awarded for a valuable application of chemical research to industry, will be presented on November 9 to Dr. Floyd J. Metzger, New York City, vice-president in charge of research and development of the Air Reduction Company.

DR. G. CANBY ROBINSON has accepted an invitation to go to the Peiping Union Medical College as visiting professor of medicine for five months, beginning on January 1. He plans to go out by way of Europe, starting on November 1.

A. W. FAHRENWALD, professor of metallurgy and ore dressing, has been appointed acting dean of the School of Mines of the University of Idaho, to fill the vacancy created by the resignation of Dean John W. Finch, who recently resigned to become chief of the U. S. Bureau of Mines.

PROFESSOR CHARLES A. CORCORAN has been made head of the department of physics of the College of the City of New York, succeeding Professor William Fox, who has retired with the title of professor emeritus.

AT Vanderbilt University, Dr. Seale Harris, Jr., has been promoted to an associate professorship of medicine and Dr. Jack M. Wolfe to an assistant professorship of anatomy.

DR. JOHN GAMBLE KIRKWOOD, research associate at the Massachusetts Institute of Technology, has been appointed assistant professor of chemistry at Cornell University.

DR. ALBERT B. REAGAN, who retired from the U. S. Indian Service on June 30, has become a special research worker in the department of geology and anthropology of Brigham Young University. He will conduct advanced classes in archeology at the university and will investigate Indian remains of the Utah Lake district.

DR. HANS BETHE, formerly docent in physics at the University of Munich and during the past year lecturer in physics at the University of Manchester, has been appointed acting assistant professor of physics at Cornell University. He will take up his work, which is in the field of theoretical physics, at the beginning of the second term. In the meantime he planned to participate in a symposium on nuclear physics at the conference on physics at London and a symposium on metals to be held in Geneva later in the fall, as well as to engage in some joint theoretical

studies on metals with Professor N. F. Mott at the University of Bristol.

DR. PAUL S. MARTIN has been made acting curator of the department of anthropology at the Field Museum of Natural History. He will assume charge of the department in succession to the late Dr. Berthold Laufer. Dr. Martin has been assistant curator of North American archeology at Field Museum since 1929. During that time he has revised the museum's collections representing the archeology of North American Indian tribes, and as leader of the Field Museum Archeological Expedition to the Southwest has conducted four seasons of excavations and research on the Lowry ruin in Colorado, a prehistoric Indian site.

DRS. HARLOW SHAPLEY, Donald H. Menzel and Loring B. Andrews, of the staff of the Harvard Observatory, were recently appointed members of the board of regents of *The Telescope,* a new popular illustrated magazine of astronomy, published by the Bond Astronomical Club with the cooperation of the staff of the observatory.

NORMAN TAYLOR, editor for botany of the new Webster's Dictionary, has become editorial and promotion adviser in the field of natural science and outdoor life for the Houghton-Mifflin Company. He will carry on his work at the New York office of the publishers.

TAMIJI KAWAMURA has been made director of the Zoological Park at Kyoto, Japan, succeeding Tsuji Suzuka, who has retired.

PROFESSOR R. ADAMS DUTCHER, head of the department of agricultural and biological chemistry at the Pennsylvania State College, has returned from a six-months trip through Germany and neighboring countries, where he has been making a study of agricultural and biochemical research under the auspices of the Oberländer Trust of the Carl Schurz Foundation and as collaborator in research with the U. S. Department of Agriculture.

PROFESSOR D. D. JACKSON, of the department of chemical engineering at Columbia University, visited the Scandinavian countries and Russia during the summer.

PROFESSOR A. C. NOÉ, associate professor of paleobotany at the University of Chicago and research associate of the Field Museum, recently visited Mexico City in order to make studies of type fossils of Liassic plants.

JOHN F. BASS, JR., and Donald J. Zinn, of the Bass Biological Laboratory in Englewood, Florida, have returned from a survey of the Danish fisheries. With the cooperation of the Danish Biological Station and of the Carlsberg Laboratories in Copenhagen, they collected data on the lobster, shrimp, plaice, mackerel and herring fisheries, as well as on the fungus disease of *Zostera m.*

PROFESSOR YANDELL HENDERSON delivered a lecture before the Brazilian Academy of Medicine in Rio de Janeiro on September 7, on "Asphyxia and Resuscitation," and participated in a conference of the Educational Association of Rio on Medical Education. On September 17 he made an address at the opening of the new building of the Institute of Hygiene in São Paulo, Brazil, and on September 18 he lectured before the Medical Society. Through the courtesy of Dr. Afranio do Amaral, director of the Instituto Butantan, Professor Henderson was enabled to make a trip into the interior of Brazil, as well as to inspect the work of Dr. do Amaral on snake venins and antivenins and that of the Medical School, erected recently with funds from the Rockefeller Foundation and organized along American lines, as well as the hospital of São Paulo. Through the courtesy of Dr. F. L. Soper, of the Rockefeller Foundation, in charge of the investigation of yellow fever with headquarters at Rio, he was also enabled to learn at first hand of the results of the study on the applications of epidemiology.

THE first Harvey Society Lecture of the season will be given at the New York Academy of Medicine at eight-thirty on Thursday evening, October 18, by Dr. William Bosworth Castle, associate professor of medicine of the Harvard Medical School, on "The Etiology of Pernicious and Related Macrocytic Anemias."

DR. WOLFGANG KÖHLER, professor of philosophy and director of the Psychological Institute at the University of Berlin, is the first psychologist to be appointed William James lecturer in philosophy and psychology at Harvard University. His predecessors are Professors John Dewey and Arthur O. Lovejoy. There will be ten lectures, at five o'clock, on Tuesday afternoons, from October 9 to December 11. Professor Köhler has chosen for the title of his lectures: "Beyond Psychology: Psychology and the Study of Nature."

DR. HANS LAUBER, professor of ophthalmology, University of Warsaw, Poland, addressed the faculty and students at the School of Medicine of the George Washington University on October 2, on "Heredity, Particularly in Relation to the Eye."

A SPECIAL program of papers in the field of hydrobiology and aquiculture, such as was given at the New Orleans, Des Moines and Cleveland meetings of the American Association for the Advancement of Science, will again be offered at the coming Pittsburgh meeting. Any one desiring to offer an original con-

tribution in this field should communicate with Professor J. G. Needham, Cornell University, Ithaca, New York, who is chairman of the committee in charge.

THE twenty-eighth annual convention of the Illuminating Engineering Society, meeting in conjunction with the National Lighting Equipment Exposition, opened in Baltimore on October 1.

THE sixteenth National Metal Congress and Exposition, the first to be held in New York City, opened on October 1 with an attendance of over 5,000. A five-day program was arranged, including reports and discussions on "what metals can do and what can be done to metals to make them serve industry better." The organizations participating are the American Society for Metals, American Welding Society, American Society of Mechanical Engineers, Wire Association and the American Institute of Mining and Metallurgical Engineers, iron and steel division and non-ferrous metals division. The exposition, held at the Port Authority Commerce Building, shows the exhibits of 173 leading producers of metals, as well as of manufacturers of equipment for treating and testing metals. The exhibits included steel and many of its latest alloys, cast iron, copper, nickel, monel metal, molybdenum, vanadium, titanium, etc.

THE *Journal* of the American Medical Association reports that the international committee for the standardization of methods in anthropology and eugenics met recently in Bologna, under the chairmanship of Professor Frassetto, director of the Anthropologic Institute of the university. Professor Weninger, director of the Anthropologic Institute of the University of Vienna, spoke on the standardization of the methods of describing external somatic characters, and of the morphologic, anatomic and histological complexes. Professor Davenport, of the Carnegie Institution (Cold Spring Harbor), proposed in his paper some new methods pertaining to anthropometry as applied to living subjects. Professor Fischer, rector of the University of Berlin, suggested a questionnaire for the study of racial crossings, based on the analytic genealogical method. The society will publish a bulletin that will summarize all publications dealing with anthropologic methodology. Contributions on the researches of societies and of individual investigators of all countries will be solicited. The material thus collected will be evaluated and coordinated and will serve as the basis for the compilation of the "Codex Anthropologicus," which will be published by the society.

Nature writes that at the general meeting of the Iron and Steel Institute in Brussels, which opened on September 10, it was announced that the King of the Belgians had accepted nomination as honorary member. This continues the tradition by which King Leopold II and King Albert I were honorary members of the institute. The council is proposing Sir Harold Carpenter for election as president at the annual meeting of the institute in May, 1935, and James Henderson, president of the British Iron and Steel Federation, has been elected honorary treasurer in succession to Sir Harold Carpenter, who is resigning at the end of September. The next meeting will be held from May 1 to 3, 1935.

Museum News reports that work was begun on August 8 on the Lake Washington Arboretum near Seattle, Washington. The Washington Emergency Relief Administration has allotted $300,000 for the purpose.

THROUGH the death of Mrs. Davis, the balance—$50,000—of the bequest of the late Dr. John E. L. Davis becomes available to the New York Homeopathic Medical College and Flower Hospital. The income from the Ella V. von E. Wendel bequest now becomes available through an arrangement by which the management of the estate is given over to a committee of the beneficiaries. Each of the legatees may now receive annually their share of the income from the estate.

THE Onyx Oil and Chemical Company, Jersey City, N. J., has founded an industrial fellowship in the Mellon Institute to study the scientific investigation of problems in textile processing and finishing. Dr. Robert N. Wenzel, who has been an industrial fellow since 1927, has undertaken this work.

THE Berne University Foundation for the Advancement of Researches on Encephalitis has offered a prize of 1,000 Swiss francs for the best work on the diagnosis and treatment of encephalitis. Competitors should communicate with the dean of the Faculty of Medicine of Berne.

THE *Wistar Institute News* writes: "We are gratified to note the willing cooperation of many institutions in making contributions to assist in defraying the expense of publishing papers which are unusually expensive to print. There has been, for some time past, a growing sentiment that a fraction of the cost of publishing research should be regarded as a part of the cost of a research and as such be paid by the laboratory to which the research is credited. The large grants formerly made by the Rockefeller Foundation to the National Academy of Sciences to aid in publishing research have been discontinued because of the belief that research institutions should recognize their responsibility. We understand that a committee has been appointed by the National Research Council to consider what proportion of publication costs should be borne by an institution sponsoring research. Probably no other institution can publish research with as little call upon the laboratories as the Wistar Insti-

tute. This is due to several factors: the extensive distribution of its journals; the economic production of its publications through standardization methods and the maintenance of its own press, and the special endowments for some of the journals. There are some institutions doing excellent work, who cannot always afford to contribute toward the cost of publications. Until institutions become conscious of their share of the responsibility in publishing their own research it is necessary to be lenient and do what we can in such cases."

According to an Associated Press dispatch work has started on the Medical Center at Shanghai. The center will include a medical college and a hospital. The site, consisting of twenty-one acres in the French concession, was purchased nearly ten years ago by the Rockefeller Foundation for $440,000. Its value is said to be now a million and a half dollars. At the time of the purchase the Rockefeller Foundation proposed to build medical centers at both Peiping and Shanghai. The Peiping Union Medical College was constructed at a cost of about $9,000,000. Meanwhile the Shanghai site lay idle. But the medical center idea was never abandoned and when the citizens of Shanghai showed a desire to put the project through, the property was offered as a site. It was turned over without cost and without "strings" to the board of directors of the Shanghai Medical Center. This organization is composed of twenty-seven persons, all Chinese, including government officials, bankers, business men and physicians. It is headed by Dr. H. H. Kung, Chinese Minister of Finance. Gifts from individuals and organizations in Shanghai amount to $200,000. Extensions will be built as more funds become available.

DISCUSSION

THE LANDING PLACE OF DE SOTO

This might seem a historical question rather than one of scientific interest, but the records of De Soto's expedition are of so much importance to ethnologists that I am venturing to send the following note to Science.

Most students of the De Soto narratives have long been of the opinion that the explorer's landing, which occurred at the end of May, 1539, was somewhere in Tampa Bay, but there is occasional dissent, and therefore it seems well to place on record the testimony of an early document which appears to be decisive. This is a letter preserved in the Archivo General de Indias at Sevilla, a copy of the essential portions being contained in Volume VI of the Lowery Manuscripts in the Manuscripts Division of the Library of Congress. It is dated October 13, 1612, and was addressed to the King of Spain by Juan Fernandez de Olivera, governor of Florida. A note referring to it is contained in the writer's work entitled "Early History of the Creek Indians and their Neighbors," published as Bulletin 73 of the Bureau of American Ethnology, in 1922, page 328.

The greater part of this letter is devoted to the account of an expedition sent to the Gulf coast of Florida in June, 1612, from St. Augustine, seemingly by the Suwanee River or the Withlacoochee. It was commanded by Ensign Juan Rodriguez de Cartaya, under whom were a pilot and twenty soldiers, the object being to induce the chiefs of two unmissionized provinces, Pooy and Calusa, to cease their attacks upon Christianized Indians living farther north. The explorers left their long-boat (lancha) at the mouth of the river down which they had come and continued on south in dugout canoes. First they came to the province of Pooy, in other documents called Pojoy or Pojoi, which lay close to a province known as Tocobaga. The Bay of Pooy was in N. Lat. 27 1–3°. Next they came to a big river named Tampa in N. Lat. 26 1–6°, finding great towns along the coast and in the river itself. Finally they reached the town of the Calusa chief in another great river with a bar (barra) in front, in N. Lat. 26°.

The latitudes given are evidently too low, but there is no mistaking the points intended. Pooy can only be Tampa, and the Tampa of the explorers, Charlotte Harbor, while the river of Carlos is the Caloosahatchee, the bar being Sanibel Island. The figures are short by about half a degree, and the latitude of the river down which they came a degree or more, since they place it in N. Lat. 28°. The following general description of the coast now follows, which, on account of its importance, I give in Spanish and English:

Toda esta costa desde cerca el rrio á donde esta la lancha en altura de veinte y ocho grados hasta veinte y cinco que es la caveza de los martires dista ito (*perhaps intended for* distrito) de pooy y carlos me aseguran el dicha alferez y piloto que la mejor y mas limpia que se puede desear y tan ondable que se puede llegar cerca de tierra en toda ella con grandes navios y que ay barras y rrios para que pueden entrar dentro en particular la bahia de pooy que es á donde dizen los yndios desembarco el adelantado Hernando de Soto y segun su capacidad pueden entrar armada y armadas dentro.

(This entire coast from the neighborhood of the river where the long-boat is, in latitude 28, to latitude 25, at the head of the Martyrs, the district (?) of Pooy and

Carlos, the aforementioned Ensign and Pilot assure me to be the best and freest of shoals that could be desired and so deep that one can come close inshore everywhere with big ships and that there are bars and rivers so that they can go inland, in particular the bay of Pooy where, say the Indians, Governor Hernando de Soto disembarked and on account of its capacity a fleet, and indeed fleets, may enter.)

This was written almost precisely seventy-three years after De Soto landed, and, while I am well aware of the fallibility of Indian tradition when extended over a long period of time, seventy-three years may be spanned by a single life, and the landing happened when the parents of most of the adult Indians in Tampa Bay in 1612 were alive. Moreover, the event must have been of exceptional importance to them, as the first intimate contact they had with representatives of the white race. The conclusion seems inevitable that it was in Tampa Bay that De Soto disembarked his army.

John R. Swanton
Smithsonian Institution

AGAIN "WHY DANDELIONS?"

The recent note in this journal[1] by Emmett Bennett on "Why the Dandelion?" contains some statements which should be commented upon in order that misconceptions may not follow.

It can be agreed that the dandelion leaf clearly excels other commonly used vegetable green leaves in the diet, in protein, fat, carbohydrates, iron and ash. The content of vitamins is only on a par with that of others. Sherman's analyses do not show that the dandelion excels in calcium. My own analyses convince me that it also does not excel in phosphorus, although the results of Sherman and Bennett do point in that direction. The phosphorus content (in which I am particularly interested) is compared in Table 1 with four other commonly used leaves. This table will also serve to show that there is much variation in analytical figures for leaves. This is most likely due to a real difference in phosphorus content, but also to age and selection of samples and to analytical methods and technique.

TABLE 1

Mg Per Cent. of Phosphorus in Dry Matter[2]

	Dandelion	Spinach	Celery	Lettuce	Cabbage
Sherman[3]	1.07	0.55	0.80	0.81	0.34
Bennett[4]	0.51	0.36	....	0.26	0.28
Youngburg[5]	0.44	0.82	0.74	0.45	0.47

On the whole, considering chemical composition, taste, convenience in obtaining by the consumer, cost, etc., I believe that the dandelion is eaten not because its chemical composition is outstanding, but because of the human desire for variety in taste of food and the novelty of picking and preparing the green leaves at no cost.

If the dandelion excelled in taste it would have supplanted spinach, cabbage, lettuce, etc., in our dietary; on the contrary, since it is somewhat inferior in taste, we do not find it on the market; other similar vegetables have become preferred from the beginning and have routed the dandelion except as a novelty.

Perhaps the statement "Our taste is not as fallacious as we sometimes think" is neither affirmed nor denied by the above.

Guy E. Youngburg
University of Buffalo
Medical School

[1] Science, 80: 142, 1934.
[2] Sherman's figures are calculated from his values on the moist basis.
[3] "Food Products," third edition, The Macmillan Company, New York, 1933.
[4] *Loc. cit.*
[5] Unpublished data.

PROGRESSIVE DEAFNESS

About 20 per cent. of the cases of progressive deafness, so-called otosclerosis, present an array of neurologic signs. In a definite proportion of these cases the deafness is merely symptomatic of a localizable intracranial lesion, and responds to operative or other therapy directed at the lesion.

In a fairly large per cent. of the cases the scattered nature of the neurologic signs do not permit of localization of the cerebral pathology. These cases present with regularity an abnormal response to the head-neck past-pointing sign described by me in 1929, which has proved to be a reliable index of pressure on the brain-stem.[1]

In recent researches on this latter group of cases there has been brought to light a new and unsuspected type of intracranial lesion giving rise to deafness of the type generally labelled otosclerosis. Encephalograms of such cases generally reveal obstruction of the distribution of the cerebro-spinal fluid in the form of dilatation of one or more cerebral ventricles. In these cases the removal of cerebro-spinal fluid and its replacement by air, as is done in the process of encephalography, has resulted in severe traumatic nervous reaction, followed by marked improvement in hearing and other associated symptoms, such as tinnitus, and in the clearing up of the head-neck past-pointing and other neurologic signs.

Though the exact nature of the pathology of these cases has not yet been determined, it appears probable that it is adhesions of the meninges, with possibly cyst formation, consequent upon injury or disease;

[1] E. M. Josephson, *Laryngoscope*, January, 1929.

and that the process of replacement of cerebro-spinal fluid by air causes their disruption.

E. M. Josephson

THE OXIDATION OF CARBON MONOXIDE CATALYZED BY NITROGEN DIOXIDE

The rates of this reaction at 500° C. have been studied. The effect of NO_2 increases to a maximum. This can be explained readily by assuming that O atoms are furnished by the NO_2 which are removed by NO_2 as its concentration is increased. The catalyzed reaction was found to be very sensitive to small amounts of hydrogen or water vapor, the rate increasing rapidly to infinity, as the concentrations of these substances increases. This effect suggests the appearance of atomic hydrogen chains in the system, which increase the total rate of oxidation. A complete study of these reactions will be presented shortly.

R. H. Crist
O. C. Roehling

Columbia University
New York, N. Y.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A DEVICE FOR MICROMANIPULATION

During the summer of 1930, while working at the Marine Laboratory of the Collége de France at Concarneau in Finistère, a situation arose which led to the construction of a very simple device by means of which it is possible to accomplish, in a slightly crude way to be sure, many of the relatively delicate operations ordinarily requiring the use of one of the more complicated and expensive types of micromanipulator. Since it is easily constructed at no expense and has numerous possible applications, it may very well be of interest to other investigators and hence is described here.

The question which was being studied involved three types of manipulation, *viz.*, the removal of a rather tough membrane from an egg, the sectioning of the egg in a definite plane and the subsequent isolation of the two fragments of the egg. After numerous attempts to manipulate a fine glass needle-knife and a micro-pipette free-hand under the compound microscope, an experience which any one who has had no previous training will find most irritating, a small appliance was made which may be used with great dexterity by any one who has had any experience with the manipulation of the ordinary slide. Free and accurate movement in any direction depends on the fact that the experimenter is acquainted with the direction of movement of the object on the slide but has to learn the movements of a needle or similar piece of equipment moved by hand only to find that even after considerable practise such motions are likely to be jerky at the very moment when they should be most steady. The pipette or needle is therefore held stationary in the center of the field, while the slide bearing the egg or other object to be worked upon is moved from place to place on the carrier. One has the additional advantage of a moist chamber for the culture. With very little practise it is possible to become quite skilful in the use of the apparatus.

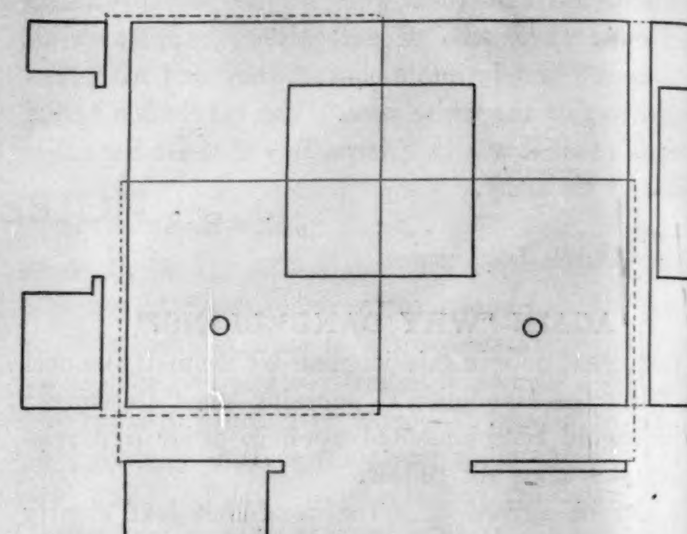

Fig. 1 (×½).

Drawings of the surface view as well as projections are given in Fig. 1. The measurements are for a convenient size, which may, of course, be varied as desired. Wood may be used in constructing the holder, though care must be taken that a non-porous variety is selected. The block must be planed and well sanded to reduce to a minimum the friction between the bottom of the block and the stage. It is also essential that the finished product be of equal thickness throughout if the object is to remain in focus as the carrier is moved from one position to another within the field. The exposed surfaces of the block may be waterproofed by waxing if desired, but none should be put on the lower surface, as that will increase the friction between the bottom of the block and the stage and irregular movements will result.

The apparatus may be described best in terms of its use. A piece of square filter paper is folded so that it is not over ½ inch wide and 4½ inches long. This is wet with tap water and placed in the undercut recess seen in the projection at the left and at the left of the projection below. Care must be taken that the filter paper is not too wide, for in that case it may touch the stage or moisture from it may dampen the bottom of the carrier. The clips of the

microscope are then placed in the holes seen in the surface view $\frac{3}{4}$ inch from each side and $\frac{5}{8}$ inch from the lower edge. These are used to hold the large 2 inch by 3 inch slide or heavy cover glass on which the culture is placed. The cover glass is essential if the work to be done requires the higher powers of magnification. The culture is suspended in a hanging drop in the center of the square opening shown in the surface view and in the projections below and to the left. The instrument to be used is held in one hand and enters the moist chamber through the opening seen in the projection to the right.

The wet filter paper which is placed around the chamber maintains a humidity sufficiently high to prevent any considerable amount of evaporation from the culture over quite a long period of time. It is possible, therefore, to keep eggs in the chamber under constant observation until they reach the stage desired for operation and afterward to follow the immediate effects of the manipulation before transferring them to other containers without subjecting them to a hypertonic medium. This was done regularly in the experiments mentioned above. It is wise, however, if the culture is to remain in the cell for a relatively long time, to close the open end temporarily with a small door of cardboard or some similar material to reduce the area of exposure through which evaporation may take place.

Leigh Hoadley

Harvard University

A CONSTANT-RATE DROPPING DEVICE FOR LIQUIDS[1]

In Science, Vol. 79, No. 2059, p. 545, Dr. J. H. Wales, of Stanford University, describes a "Device for Constant Flow of Liquids," which is similar to one I devised a number of years ago, and which is described on page 76 and illustrated in Fig. 3 of the British Medical Research Council Report of 1923 entitled "The Wasserman and Sigma Reaction Compared."

Another device for the same purpose is illustrated herewith, which has the advantage that the distance between the dropping tube and the receiving vessel is held constant. In operation, fluid from the reservoir "R" is allowed to flow into the apparatus, the

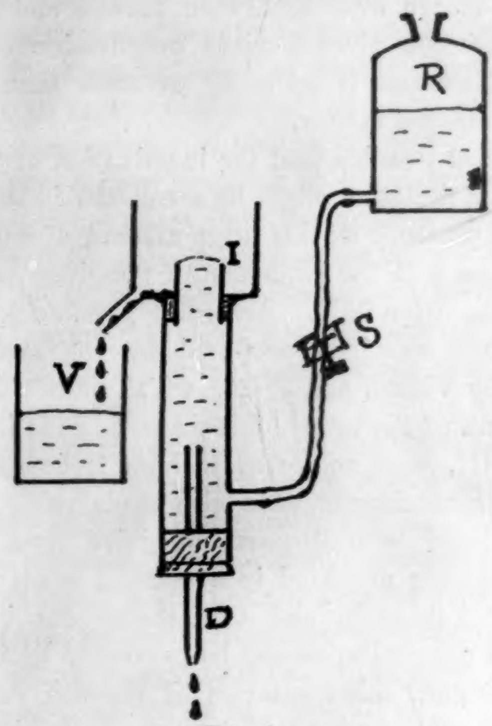

Fig. 1.

rate being adjusted by the screw-clamp "S" until a slight excess runs over the edge of the inner tube "I" continuously. This excess collects in vessel "V" and may be returned to the reservoir. The number of drops delivered per minute depends on the size of the orifice of the dropping tube "D" and the distance between this orifice and the top of the inner tube "I." The dropping rate may be adjusted, within limits, by sliding the tube "D" up or down through its cork.

The outer shell of the apparatus was made from an old student-lamp chimney; the edge of the inner tube "I" was ground flat on a rough stone so that the excess fluid would flow smoothly over it; the inner tube was held in place by a piece of thick rubber tubing, filling the space between it and the outer shell.

H. F. Pierce

SPECIAL ARTICLES

THE ACTION OF HIGH FREQUENCY SOUND WAVES ON TOBACCO MOSAIC VIRUS[1]

Recently Takahashi and Christensen[2] reported that tobacco mosaic virus is inactivated by high frequency sound waves.[3] They found that the inactivation of virus progressed with exposure, until

[1] From the Wilmer Institute of the Johns Hopkins University and Hospital.

[1] Thanks are due Professor E. Newton Harvey for the use of his laboratory where all the radiation experiments were performed, and Mr. Charles Butt for the use of his high frequency oscillator and for much helpful technical assistance.

[2] William N. Takahashi and Ralph J. Christensen, "The Virucidal Action of High Frequency Sound Radiation," Science, 79: 415, 1934.

[3] For a general survey and literature on supersonic waves see: E. Newton Harvey, "Biological Aspects of Ultrasonic Waves, a General Survey," *Biol. Bull.*, 59: 306–325, 1930; Leslie A. Chambers and Newton Gaines, "Some Effects of Intense Audible Sound on Living Organisms and Cells," *Jour. Cell. and Comp. Physiol.*, 1: 451–471, 1932.

after about 2 hours no active virus could be demonstrated by inoculating leaves of *Nicotiana glutinosa* L. The virus which they used was in the centrifuged juice from infected tobacco leaves which had been crushed, frozen overnight, then thawed and pressed. This procedure gives a virus preparation of which the solid content is made up of more than 99 per cent. extraneous matter.

It seemed possible that the inactivation of virus by supersonic radiation might be associated, in some way, with the presence of this large amount of extraneous material or with the expulsion of dissolved gas (cavitation) from the fluid. Accordingly, colorless, water-clear virus solutions prepared by the method described by Vinson and Petre,[4] which contain less than 1 per cent. of the total solids present in the infectious juice itself, were subjected to high frequency sound waves. Experiments were also made using purified virus diluted with 9 parts of juice from healthy tobacco plants prepared in a manner similar to that used by Takahashi and Christensen for infectious juice. Since cavitation can be prevented by removing dissolved gas,[5] other samples of purified virus were sealed in tubes under a high vacuum and irradiated. The tubes were placed in a water bath at 40° C. and evacuated for 10 minutes before sealing. Virus in infectious juice prepared by the method of Takahashi and Christensen was also irradiated, both at atmospheric pressure and under a high vacuum.

[4] C. G. Vinson and A. W. Petre, "Mosaic Disease of Tobacco. II. Activity of the Virus Precipitated by Lead Acetate," *Contrib. Boyce Thompson Institute*, 3: 131–145, 1931.

[5] See reference note 3.

A 500-watt apparatus similar to that described by Harvey[6] was used in the experiments to be reported. The virus samples, usually 3 cc, were subjected to supersonic radiation at about ½ intensity for nine 10-minute periods with a 5-minute interval for cooling between periods. While it is difficult to compare the sound intensity in different laboratories, the height of the fountain of oil directly above the quartz crystal may be used as a rough measure. This fountain was about 2.5 to 3 centimeters high at the intensity used in the present experiments. It is believed that the apparatus delivered as much, and very probably a greater, sound intensity than that produced by the 75-watt apparatus used by Takahashi and Christensen. Containers for the virus were tubes of Pyrex glass 20 cm long, having a diameter of 12 mm and a bulb about 20 mm in diameter on one end. These tubes were suspended in the oil directly over the quartz crystal by means of a string attached to a wooden support, so that the bulbs were 1 or 2 mm above the electrode. Tubes used for untreated infectious juice in one experiment were used for purified virus in the next experiment in order to eliminate differences due to the tubes. The temperature of the oil bath was maintained at 23° C. by means of a glass coil of circulating cold water. The temperature of the samples of purified virus did not go above 29° C. at any time, while the temperature of the samples of infectious juice and of purified virus diluted with juice from healthy tobacco plants was about 41° C. at the end of the 10-minute periods. This temperature is insufficient to cause a noticeable inactivation of virus over the period of time required for the ex-

[6] *Ibid.*

TABLE I

THE EFFECT OF HIGH FREQUENCY SOUND RADIATION ON VARIOUS PREPARATIONS OF TOBACCO MOSAIC VIRUS

Tested on →		*Nicotiana glutinosa*			*Phaseolus-vulgaris*			Average of all tests on all plants
Dilution →		1	10	100	1	10	100	
Infectious juice[a] (Atmospheric pressure)	Average[b]	8.8	3.8	1.2	8.8	5.1	1.9	4.9
	Actual[c]	6.0	1.8	0.2	7.0	5.4	0.3	
Purified virus plus non-infectious juice (Atmospheric pressure)	Average	11.7	9.5	1.7	12.0	8.6	7.6	8.5
	Actual	4.6	3.2	0.2	7.2	3.2	0.7	
Infectious juice (High vacuum)	Average	98.0	82.9	86.0	97.0	85.5	73.5	87.2
	Actual	57.5	27.5	16.3	89.0	65.9	34.6	
Purified virus (Atmospheric pressure)	Average	73.5	46.5	55.0	76.5	58.3	53.6	58.8
	Actual	17.8	11.6	5.4	79.0	59.0	28.4	
Purified virus (High vacuum)	Average	89.4	92.0	109.0	102.0	88.5	98.0	96.5
	Actual	46.6	36.5	20.2	164.3	83.0	30.2	

[a] Virus preparation similar to that described by Takahashi and Christensen.

[b] Numbers represent the quotient obtained when the average number of lesions per half-leaf obtained on 10 or more half-leaves of *N. glutinosa* or 16 or more half-leaves of *P. vulgaris* with the designated virus preparation is divided by the average number of lesions per half-leaf obtained on the other halves of the same leaves with the corresponding control preparation, multiplied by 100.

[c] Numbers represent the average of the actual number of lesions per half-leaf obtained on 10 or more half-leaves of *N. glutinosa* or 16 or more half-leaves of *P. vulgaris* on inoculation with the designated virus preparation.

eriment. The fact that the temperature of virus reparations containing much extraneous matter rose bout 12° C. higher than the temperature of purified irus preparations indicates that the former absorb uch more energy.

Immediately after each experiment the irradiated reparations and the corresponding control preparaions were tested on half-leaves of *Nicotiana glutinosa* nd *Phaseolus vulgaris* L. Dilutions of infectious uice were made with distilled water and dilutions f purified virus were made with 0.1 M phosphate t pH 7. The average of the actual number of lesions er half-leaf obtained on the two species of test plants t three different dilutions of the various preparations f irradiated virus is given in Table I. Another umber which represents the average of the lesions btained with an irradiated virus sample, expressed s a percentage of the average number of lesions obained with the corresponding control, is also given or each preparation at each dilution. This number ndicates the amount of virus present.

It may be seen from Table I that virus prepared s described by Takahashi and Christensen is almost ompletely inactivated at atmospheric pressure. This s in complete accord with their results. Purified irus diluted with 9 parts of untreated juice from ealthy tobacco plants is also almost completely inctivated. However, if infectious juice is sealed under high vacuum in order to prevent cavitation and then rradiated there is but slight inactivation. Purified irus at atmospheric pressure is inactivated only to uch an extent that it gives about 60 per cent. as many esions as the untreated control, while there is practially no inactivation when purified virus is irradiated nder a high vacuum. No reactivation of virus which ad been inactivated by supersonic radiation at atmospheric pressure was found. Materials toxic to virus r to test plant are not produced during the irradiaion since the addition of such inactivated virus reparation to fresh virus has no effect on the infecivity of the active virus. In general, the results are imilar to those of previous workers[7] who have found hat cells or particles affected by supersonic waves at tmospheric pressure were unaffected under a high acuum.

The results indicate that inactivation of virus by upersonic radiation is associated with cavitation of issolved gas and with the presence of extraneous atter found in untreated juice, since high frequency ound waves of great intensity have practically no ffect on purified virus under a high vacuum.

W. M. STANLEY

THE ROCKEFELLER INSTITUTE FOR
MEDICAL RESEARCH,
PRINCETON, NEW JERSEY

[7] *Ibid.*

GROWTH OF YEAST BELOW ZERO

THOUGH the growth of "false" yeast, as Torula species, below 0° C. has been recorded,[1,2] probably most bacteriologists incline to the belief that the minimum temperature requirements of "true" yeasts, or forms which sporulate and reproduce by budding, are above the freezing point of water. That this is not true of all representatives of the genus Saccharomyces has been proved in this laboratory in connection with the storage of cider at low temperatures. On two occasions about half the number of 500 cc portions of fresh cider in sealed containers held at −2.2° C. (28° F.) developed pressures of 15 or more pounds per square inch after 2 months storage. Such samples contained many millions of yeast cells per cc and were unmistakably alcoholic.

Of several strains of yeasts isolated from the fermented cider, one in particular has shown ability to increase at −2.2° C. Beer wort, pH 4.8, has been used as the medium, and the rise in number of cells has been followed in the haemocytometer from small samples of the well-agitated culture aseptically withdrawn at about 5-day intervals. Counts at 20, 40, 60 and 70 days are given in Table 1.

TABLE 1

GROWTH OF COLD-TOLERANT YEAST IN WORT AT −2.2° C.

Cells per cu cm				
At inoculation	After 20 days	After 40 days	After 60 days	After 70 days
1,800,000	3,840,000	17,600,000	48,400,000	49,000,000

The viable cell count on wort agar on the 66th day was 32,500,000 per cu cm.

Reproduction was most active from about the 20th to the 50th day, and as shown in the table largely ceased after the 60th day. In a portion of the culture transferred from −2.2° C. to 21° C. on the 66th day, however, reproduction was resumed, the haemocytometer count rising to 83,200,000 per cu cm in 42 hours.

The yeast in question ferments dextrose, levulose and sucrose, but not maltose or lactose. Ascospores are present in 2- to 4-week old thin wort agar plate cultures. Despite its ability to grow at −2.2° C. the yeast is not "psychrophilic" or cold-loving, as the 60-day count at the temperature mentioned is equaled in 23 hours at an incubation temperature of 21° C.

JAMES A. BERRY

FROZEN PACK LABORATORY
U. S. DEPARTMENT OF
AGRICULTURE, SEATTLE, WASH.

[1] R. B. Haines, Report of the Food Investigation Board (Gt. Brit.) for the year 1931. 46–51.

[2] J. A. Berry, "How Freezing Affects Microbial Growth," *Food Industries*, 4: 6, 205, 1932.

THE VITAMIN D ASSAY OF THE "REFERENCE COD-LIVER OIL"

DURING the past four years, this laboratory has made studies of several fundamental factors[1,2] involved in biological assays in which chicks have been employed as experimental material. The adaptability of the chick for rickets investigations, as well as for studies of bone development, has been well established, due to the following reasons: Firstly, the disease is easily produced in chicks deprived of vitamin D; secondly, reliable experimental data of value to the poultry industry may be obtained in a short space of time; thirdly, a large number of birds may be secured from a single hatching for experimental purposes; and fourthly, the results obtained with chicks are particularly suitable for the vitamin D evaluation of antirachitic supplements, especially cod-liver oils and other fish oils which are marketed for poultry.

Largely owing to the great sensitivity of the chick to rickets, there has been an ever-growing interest by nutrition investigators in this species as a satisfactory medium for vitamin D assay studies. The authors are of the opinion, due to the importance of the chick as a test animal, that some practical measure for determining the difference in bone calcification and skeletal development between the rat and the chick should be made. With this object in mind, an experimental study was planned.

A quantity (120 ccs) of the "Reference cod-liver oil" was purchased from the United States Pharmacopoeia Vitamin Advisory Board. This Reference cod-liver oil of known vitamin D potency was fed to six groups of day-old White Leghorn chicks for a period of four weeks, using the technique developed for the vitamin D assay, which was adopted by the Association of Official Agricultural Chemists.[3] A seventh group of fifteen birds served as the "negative control" lot. At the same time, three samples of commercial poultry cod-liver oils were assayed according to the routine technique employed in this laboratory.[4]

The results of this preliminary feeding trial showed that each chick required between 80 and 135 International vitamin D rat units to produce satisfactory calcification as observed by the criteria of normal growth and an average bone ash content in excess of 45 per cent. This requirement was calculated on the basis of the total length (four weeks) of the feeding period. The experiments lend support to the theory that the vitamin D requirement of the chick is enormous when compared with the requirement of the rat for the antirachitic substance in cod-liver oil. It was also noted from these investigations that the Reference cod-liver oil, containing 95 International vitamin D rat units per gram, was considerably poorer as a source of antirachitic activity than a number of commercial poultry cod-liver oils, which had been assayed for vitamin D content.

The experimental studies mentioned were completed in March of this year. It is the purpose of the authors to repeat the bioassay of the Reference oil at different seasons of the year to determine, if possible, the antirachitic evaluation of cod-liver oils and other fish oils in terms of International vitamin D units. From the standpoint of control testing of vitamin D supplements, the requirement of the chick for vitamin D, with respect to the seasonal variation in average bone ash content throughout the year, should be evaluated so that results obtained in bioassays may be better interpreted. When the complete data have been obtained, the results will be released for publication.

The aim of the present communication is to merely state the problem which is involved in reducing the chick assay of antirachitic supplements to terms of International rat units. On the basis of the foregoing discussion, the opportunity has presented itself to invite the cooperation of other workers in chick biological laboratories who may be interested in this type of study.

LAWRENCE L. LACHAT
HENRY A. HALVORSON
MINNESOTA DIVISION OF FEED
AND FERTILIZER CONTROL, ST. PAUL

[1] L. L. Lachat, H. A. Halvorson and L. S. Palmer, "Studies Relative to the Estimation of Vitamin D, I," *Jour. Assoc. Official Agr. Chem.*, 15: 660–675, 1932.

[2] L. L. Lachat, "Studies Relative to the Estimation of Vitamin D, II. Effect of Seasonal Variation and Sex upon Calcification in Rachitic Chicks," *Poultry Sci.* (in press).

[3] W. B. Griem, "Vitamin D Assay by Preventive Biological Test," *Jour. Assoc. Official Agr. Chem.*, 17: 69, 1934.

[4] H. A. Halvorson and L. L. Lachat, "Antirachitic Activity of Vitamin D Supplements for Poultry," State of Minnesota Dept. of Agr. Dairy and Food, April, 1934, 16 pps.

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